Soil Conservation

March 1977

U. S. Department of Agriculture

Lessons from the Buffalo 4

Manufacturing a Marsh 8

Melting Snow and Blazing Signals 11

From the Administrator

When water means money . . .

The threat of critical water shortages this summer in the West is drawing attention to the SCS snow survey program. Our water supply forecasts are making headlines nationwide.

With a budget of less than $3 million, the snow survey program generates benefits of more than $40 million to irrigated agriculture alone—a real return on the taxpayers' dollars.

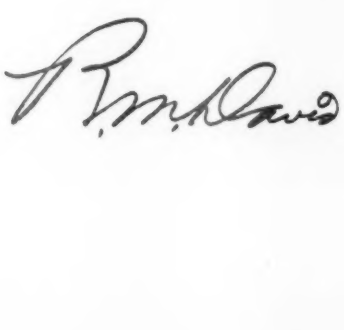
The forecasts also have proven valuable to flood control and municipal water supply agencies, reservoir operators, power companies, recreation enterprises, industries, and fish and wildlife managers. We need to communicate with more of these water users—to let them know how they can get and use water supply forecast information.

For decades snow survey data have been gathered manually. Snow surveyors had to visit high-mountain sites on skis, snowmobiles, or helicopters. Measuring snow depth and water content was more than a little dangerous in many locations.

SNOTEL, our automated data collection system, will eliminate time-consuming manual data collection on the most hazardous snow courses. The system combines automatic measuring equipment and a revolutionary meteor-burst communications technique. Scheduled to go into operation next winter, SNOTEL will provide faster, more accurate data more often on which to base our forecasts.

Although we are noted for our forecast accuracy, we can and will do better. A 10-percent improvement would save water users millions of dollars. We expect SNOTEL to improve overall accuracy by 20 to 30 percent.

As we collect and interpret facts about snow over the winter, we will continue to sharpen our ability to estimate how much water it will produce as it melts in spring and summer. We will work to help more land and water users make wise decisions that will protect resources, property, food and fiber production . . . and people.



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Secretary of Agriculture

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Cover:
More than 70 percent of the West's water supply flows from mountain snowpack. New communications techniques will speed forecast information to farmers and ranchers. See story, page 11.

Soil Conservation

Contents

From the Administrator 2

Changing the Face of the Texas Plains 4
Anne Zack

From Mess to Marsh 8
Eldie W. Mustard

Beach Clinics Draw Crowds 10
Frank Jeter, Jr.

SNOTEL: Wave of the Present 11
Manes Barton

What's It Worth? 15
Shirley J. Elliott

Plastic Pipe Replaces Ditches 16
Martin L. Clark

The World's Least Exclusive Yacht Club 18
Frederick E. Bubb

Fishing Fingers 19
George N. Coller

Patterned Soil Grows Grass in the Desert 20

Irrigation through the Grapevine 22
Charles Hamura

208 Film In Production 23

Meetings 23

Changing the Face of the Texas Plains

Texas ranchers are turning to a new type of grazing system that increases forage, cuts labor, and offers wide flexibility in management.

by Anne Zack

Foreman Jim Morrow, District Conservationist Harvey Kahlden, and C.O. Richards check kleingrass pasture (above) grazed under a short duration system on the Chadbourne Ranch. Short duration systems also can produce more and better forage on native Texas range (at left).

Across the Lone Star State, short duration grazing systems are transforming depleted, mesquite-infested rangelands into lush rolling plains.

More than 400 Texas ranchers have adopted short duration grazing systems, also called High-Intensity, Low-Frequency (HILF) systems, during the last 5 years. Texas acreage managed under planned grazing systems jumped from 2 million to 10 million during that time, largely because of the increase in short duration grazing.

What is short duration grazing? How does it work? And why is it becoming so popular?

Simply put, the system involves grouping livestock into a large herd that is rotated through a series of pastures. Each pasture receives a brief, intensive grazing followed by a much longer rest period.

"We think of ourselves as going back to the way designed by nature," explained C. O. Richards, executor of the 27,000-acre Chadbourne Ranch south of Abilene. "Buffalo practiced a form of intensive grazing. The whole herd would graze one place and then drift on."

The number of pastures in short duration systems generally ranges from 4 to 12. Cattle on the Chadbourne Ranch, for example, are divided into six herds of 300 to 400 head. The herds are rotated through six management units of eight pastures each. The pastures range in size from 350 to 700 acres.

George, John, and Franklin Halsell have developed a somewhat different short duration grazing system for their 13,000-acre ranch northwest of Fort Worth. Their cattle are grouped into a single herd of more than 1,000 head and are rotated through six pastures of 1,800 to 2,000 acres each.

Grazing and rest periods for each pasture are flexible, based on the kind and amount of available forage and on the condition of the cattle.

"The minute you start setting a definite time to change pastures, you're asking for trouble," said S. E. Kinder, foreman of the Halsell Ranch. "We may change pastures after 15 days or wait as long as 45 days, and we generally have a 4- to 6-month rest period. But we always leave enough grass in a pasture so if fire or some

"We think of ourselves as going back to the way designed by nature. Buffalo practiced a form of intensive grazing. The whole herd would graze one place and then drift on."

Chaining or other types of brush control are necessary steps in some range improvement programs.

other disaster strikes another part of the ranch, we can change the rotation and use it again immediately.

"And we watch the cattle. They start bunching near the fence when it's time to move. If you leave a cow in a pasture too long, she'll go into stress," he added. Stress results when food declines to the point it no longer meets the animal's requirements. The cow then diverts nutrients from her own body to produce milk for her calf.

"You have to temper target dates with observation," Richards agreed. "Our target date for moving cattle is 21 to 25 days to break the brucellosis cycle." Brucellosis bacteria from an infected cow rest on the ground for 28 days before they can infect other cattle, which pick them up while grazing. Changing pastures before any bacteria can become viable helps control the disease. The bacteria usually die before the pasture is used again.

Flexibility to meet specific management objectives and respond to unexpected situations is only one advantage of short duration grazing systems. Increased forage production is another.

"In 1969, we could only run about 900 head of cattle—that's only one cow to 25 or 30 acres," said Richards. "Now we have one cow to every 10 acres because of the increase in forage."

Richards also reports an increase in the amount of desirable grasses in the pasture. "If you put one cow on 1,000 acres," he explained, "she develops a taste for 'ice cream' plants. Those plants eventually disappear because they're grazed out, and less palatable plants take their place.

"By concentrating cattle, however, we force them to eat 'meat and potatoes' as well as 'ice cream.' Then when we move the herd out of a pasture, the 'ice cream' has a chance to

Leaving unplowed strips of brush provides shelter for cattle and habitat for wildlife.

John Halsell and S. E. Kidder inspect seedheads on indiangrass, a valuable native range plant that is making a comeback under short duration grazing.

"Range management is the most important part of our reclamation program. To do all the other parts without range management is just throwing money away."

come back along with the less desirable grasses."

Although cattle are moved more often then in other planned grazing systems, short duration systems require less labor.

"Labor?" Kinder grinned. "This system cuts our labor in half. We only have to drive to one pasture instead of several to check the livestock.

"We do have some problems with short duration systems," Kinder continued. "One difficulty we had was that calves would get separated from their mothers when we moved the herd from one pasture to another.

"We solved this problem by not bunching the cattle when it's time to change pastures. We just open the gate and let them work their way in. The mother brings her calf along. In a couple days, we round up the stragglers and close the gate."

Design and implementation also can be problems in a short duration system. "A complete inventory of existing forage resources and physical resources such as watering facilities, fences, and working pens is essential," according to Gary Westmoreland, SCS range conservationist. "This information, in turn, must be matched to the climate of the area and to the rancher's own objectives and constraints."

Westmoreland helped the Halsells convert their four-pasture deferred-rotation grazing system to a short duration system in 1973. The Halsells have been cooperators with the Upper West Fork Soil and Water Conservation District (SWCD) for more than 30 years. They began using planned grazing systems in 1959 when they signed a Great Plains Conservation Program contract.

"The Halsells made this short duration system work for them," said Tony Dean, SCS district conservationist at Jacksboro. "Many ranchers who run into little problems use them as an excuse to drop the system. But the Halsells made adjustments in the system and adjustments in their operation and it's working out real well. Any planned grazing system has to be adapted to the specific ranch."

On the Chadbourne Ranch, short duration grazing began as part of a range conservation plan developed in 1969 with help from SCS and the Extension Service. Richards took over the ranch that year and became a cooperator with the Runnels SWCD.

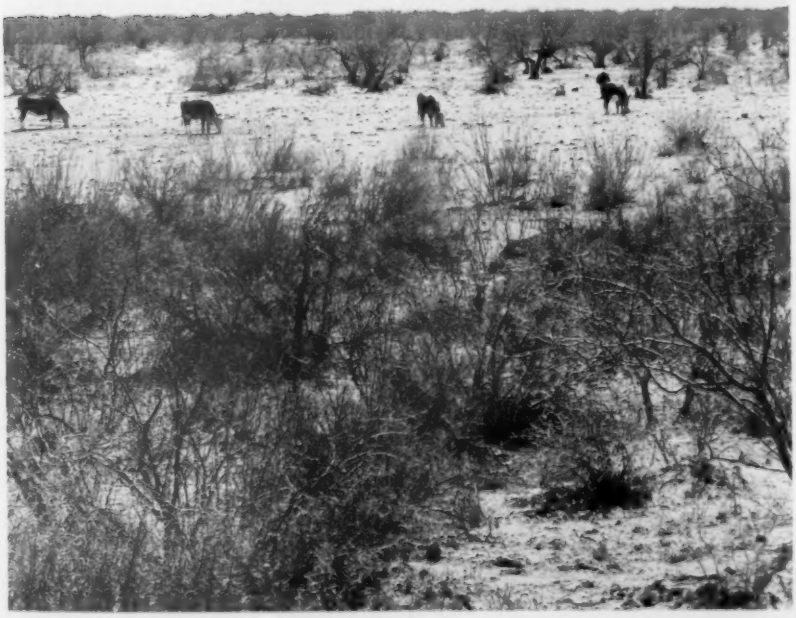
Richards plans to continue renovating 70 percent of the range and leaving 30 percent in brush strips or patterns. The brush protects cattle in severe weather and provides habitat for deer, turkey, quail, and doves.

Richards' renovation plan calls for chaining, root plowing, and tandem discing to prepare a seedbed. Then the pasture is seeded, mostly with kleingrass, by air. This work is followed up by a planned range management program that includes short duration grazing.

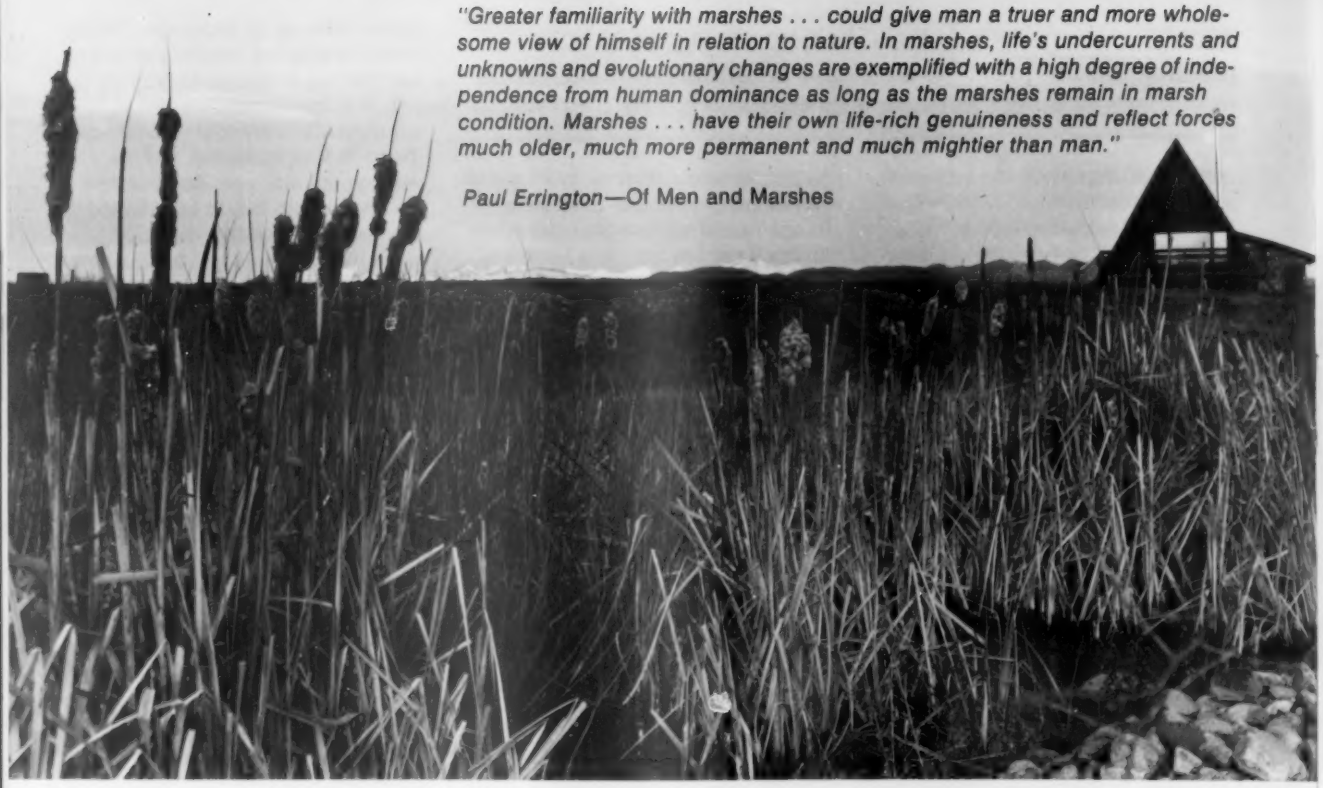
About 15,000 acres have been renovated so far, but forage production is picking up and palatable grasses are increasing on the native range as well because of the short duration grazing system.

"Range management is the most important part of our renovation program," Richards said. "To do all the other parts—the chaining, root plowing, discing, and seeding—without range management is just throwing money away."

Ms. Zack is a staff writer, Information Division, SCS, Washington, D.C.



Planned grazing systems are designed to prevent overgrazing which results in brush infestation and bare areas that are susceptible to wind erosion.



"Greater familiarity with marshes . . . could give man a truer and more wholesome view of himself in relation to nature. In marshes, life's undercurrents and unknowns and evolutionary changes are exemplified with a high degree of independence from human dominance as long as the marshes remain in marsh condition. Marshes . . . have their own life-rich genuineness and reflect forces much older, much more permanent and much mightier than man."

Paul Errington—Of Men and Marshes

A county government and a graduate student joined forces to transform an unsightly gravel mine in suburban Boulder, Colorado, into a wildlife sanctuary that would have made Thoreau smile.

From Mess to Marsh

by Eldie W. Mustard

As its name implies, Walden Ponds is not your typical gravel pit area. Boulder County, Colorado, is reclaiming the surface mine for a marshland wildlife refuge in the midst of suburbia.

The red fox has settled here and rears its young. Mule deer pass through the wetland habitat, and puddle ducks (mallards, teal, pintails) and Canada geese thrive here. The transformation from mined pits to marshlands took careful planning. But Wally Toevs and Claudia Toburen never doubted it could be done.

Three years ago, Toevs, a Boulder County commissioner, decided the mined-out pits could become a community asset. He enlisted the aid of Toburen, a graduate student in wildlife biology at Colorado State University.

Toburen created a wildlife development plan for the 130-acre surface mine as a project to help fulfill requirements for her master's degree. She received financial support from the county and guidance from the Resources Development Internship Program of the Western Interstate

Commission for Higher Education (part of the National Bicentennial Intern Program).

In developing her wildlife conservation plan, the young biologist tapped the technical knowledge and skills of many agencies, including the Soil Conservation Service, Colorado Division of Wildlife, and Colorado State Forest Service. SCS and the Boulder Valley Soil Conservation District published the plan, and Boulder County hired Toburen to implement it.

An early step in carrying out the plan was to shape excavated areas into the shallow ponds that now have developed into marshes. Migratory water birds share the shallow-water sanctuary with various birds of prey, rodents, insects, and a host of other aquatic and terrestrial creatures.

The perpendicular sides of excavated areas presented a problem. They were too steep to be revegetated, and they were unsafe—especially near water. Most of the banks were graded down to gentle slopes, but some were left for bank swallows. These birds use vertical banks for building nests and rearing young in condominium-style communities where they are safe from predators.

One pond was deepened and stocked with rainbow and brown trout. Because of its proximity to the city of Boulder and easy accessibility by car, it is reserved for fishing by senior citizens and the handicapped.

Several Boulder community groups are helping with the wildlife project. Audubon Society members have identified 134 different species of birds at Walden Ponds. On a snowy, blustery day last March, a local Bluebird chapter of the Campfire Girls of America brought wooden birdhouses to the wildlife sanctuary and helped fasten them to fenceposts.

The wildlife development plan for Walden Ponds is ongoing. The county still mines roadbuilding gravel in the area, but now topsoil is stockpiled. It will be spread over disturbed surfaces to hasten revegetation when mining is finished.

Mr. Mustard is state biologist, SCS, Denver, Colorado.

Claudia Toburen and Park Ranger Nancy Lucero plant grass, shrubs, and trees along marsh edges to provide food and shelter for a variety of wildlife.

Canada geese are among the more than 130 species of birds that have been seen in the new marshland area.

by Frank Jeter, Jr.

At "beach clinics," North Carolina waterfront property owners are learning how to fight erosion with plants.

Beach Clinics Draw Crowds

Soil Conservation Service employees along North Carolina's coast are gearing up for another summer of "beach clinics." As many as seven clinics are conducted each summer to demonstrate the use of beach grasses, shrubs, and trees on waterfront property.

Both erosion control and beautification are clinic topics. People attending learn what plants to use, generally native shrubs and beach grasses tested at SCS plant materials centers. They also learn proper planting and maintenance methods.

About 70 people attend each clinic; some return year after year.

Karl E. Graetz, former SCS plant materials specialist at Raleigh, started the clinics 4 years ago. Sid Dronen, who succeeded Graetz, now conducts the program with assistance from SCS district conservationists in coastal counties. Other environmentalists help, including experts from North Carolina State University and county government officials, nurserymen, and private citizens concerned with coastal conservation.

The day-long clinics start with a workshop held in a city hall, fire station, or other convenient building. The workshops include displays of living beach grasses and shrubs, talks, slide presentations, and discussion periods.

Copies of a publication Graetz authored, "Seacoast Plants of the Carolinas for Conservation and Beautification," and other brochures are distributed to participants.

A 2-hour tour starts after lunch. It generally includes a half-dozen stops—some where erosion problems can be seen firsthand and others where plantings have transformed problem areas into well-protected, well-landscaped sites.

Most of the clinics are held along the state's southern coast, between the South Carolina border and Cape Hatteras, but requests are increasing from areas farther north on the Outer Banks.

Since North Carolina has more than 3,200 miles of coastline—including ocean front, sounds, bays, and estuaries—those who conduct the sessions expect popularity of the "beach clinic" approach to expand each year.

Mr. Jeter is public information officer, SCS, Raleigh, North Carolina.

Beach clinic participants visit frontal dunes recently planted with American beachgrass. Raised walkway helps protect dunes and plants.

Samples of plant materials suitable for beautification and erosion control get careful study during clinic.

Meteor trails will be used to reflect VHF radio waves as part of a new snow survey program called SNOTEL, the world's first full-scale meteor burst data transmission system.

SNOTEL: Wave of the Present

Radio signals bouncing off trails blazed by tiny meteorites soon will be speeding snow and rainfall data to Soil Conservation Service offices in 10 western states.

by Manes Barton

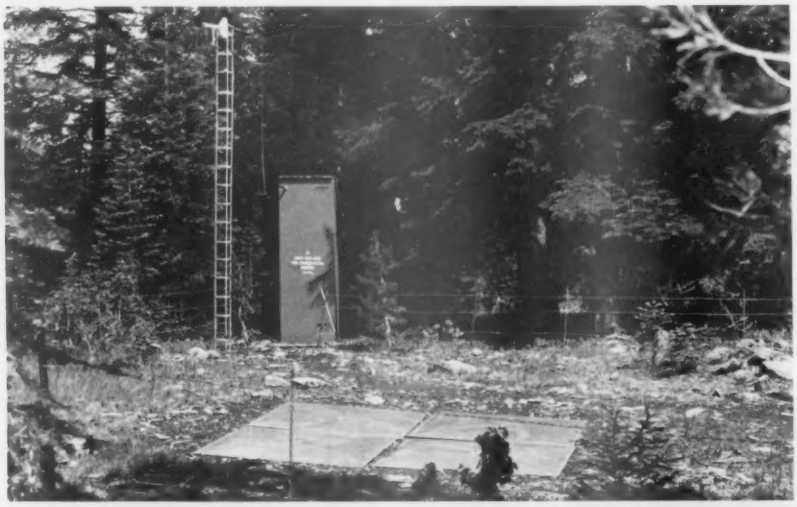
Farmers and ranchers will be getting water supply forecasts in record time when an innovative radio transmission system links remote mountain snow survey sites to Soil Conservation Service offices in the West.

Called SNOTEL, for "snow telemetry," the new system relies on the billions of sand-sized meteorites that enter the atmosphere every day. As each particle heats and burns in a zone 50 to 75 miles above the earth's surface, its disintegration creates a cigar-shaped trail of ionized gasses.

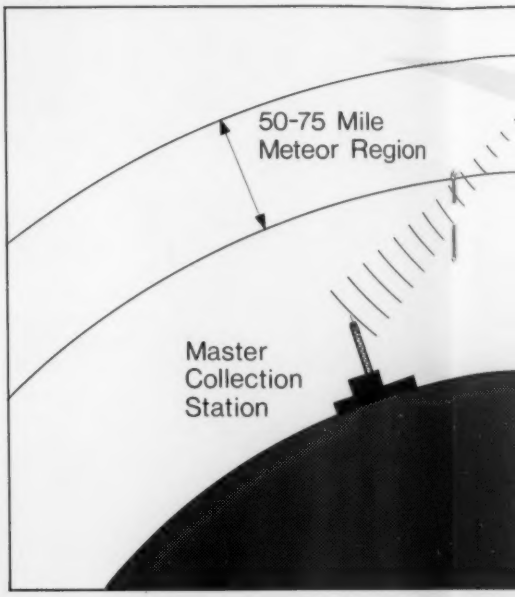
Though the ionized trails are ephemeral, their several milliseconds to a few seconds of life provide enough time to reflect VHF radio signals from ground points up to 1,200 miles apart. SCS's master collection stations at

A precipitation gage (right) is one of the sensors that will provide current information about conditions at each automated snow survey location.

Bare snow pillows at typical SNOTEL site are fenced to protect from damage by wild animals. Weight of fallen snow creates pressure on pillows that indicates snow's water content.



SNOTEL will link ground stations up to 1,200 miles apart by bouncing signals off short-lived meteorite trails high above the earth.



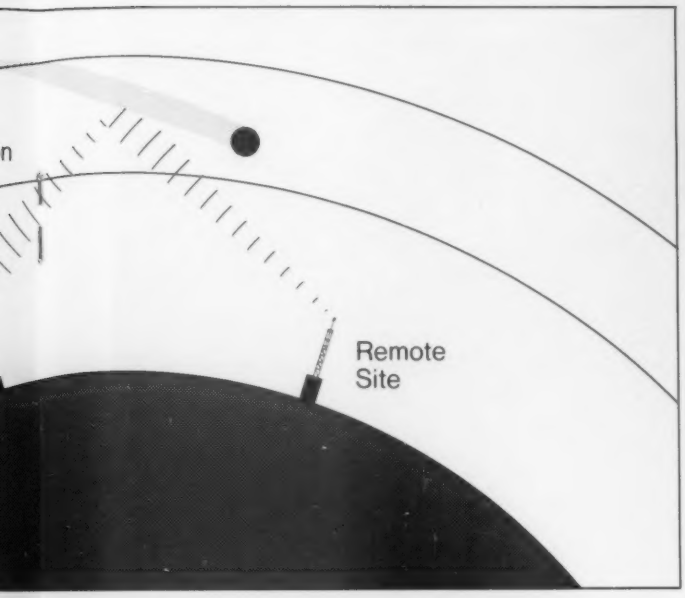
Boise, Idaho, and Ogden, Utah, will be equipped to probe the skies for meteor trails suitable for relaying data.

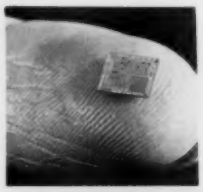
Radio signals will be beamed from the two stations to bounce off the trails and down to any of the remote sites located in the Cascade, Rocky, and Sierra Nevada mountain ranges. The reflected signal will trigger a small radio at the selected remote site which then will broadcast current snow survey data along the same short-lived route. The complete transaction will take only a fraction of a second.

Data then will be forwarded by telephone lines from the master collection stations to a computer at the SCS West Technical Service Center in Portland, Ore. Snow survey supervisors in 10 western states will be able to obtain minutes-old information from the computer via terminals located in SCS state offices.

The SNOTEL communication system is the first large-scale application of "meteor burst" technology. It was designed and is being installed by the Western Union Corporation under contract to SCS.

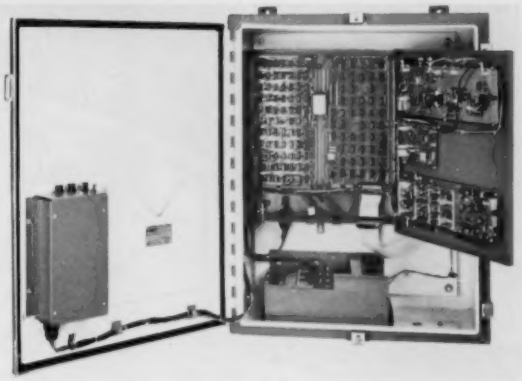
The radio will read data from as many as 16 sensors every 15 minutes and store the information awaiting the signal from a master collection station to transmit.





Microprocessors take the place of more bulky conventional integrated circuits and help radios "remember" their jobs.

An electronic package at each SNOTEL remote site collects and transmits data on command from master collection stations in Idaho and Utah.



The meteor burst phenomenon was discovered accidentally by radio operators who found their signals reaching long distances when inadvertently bounced off meteor trails. The principle gained attention when radio contact with astronauts temporarily was lost during re-entry. The cause of the blackouts: a sheath of ionized gasses surrounding the space capsule repelled radio signals.

Another key to development of SNOTEL is the recent addition of microprocessors to two-way radio systems. The revolutionary component is a tiny piece of silicon—a "computer on a chip"—that gives radio equipment the ability to store, then rapidly process and transmit data.

The SNOTEL system is the latest refinement in a federally coordinated cooperative program of snow surveying and water supply forecasting undertaken in 1935. Today, there are more than 1,700 SCS snow survey courses throughout the western United States and in Alaska.

Usually, small meadows high in watersheds are selected for snow survey courses. Although automated measuring devices have been installed at many remote sites during the past decade, snow surveyors still visit most locations on set schedules. In a typical snow survey season, surveyors travel more than 50,000 miles by oversnow machines, skis, or snowshoes to bring back snow survey information for computing water supply forecasts.

Snow-gaging equipment and other measuring devices at the SNOTEL remote sites generally will be the same as those used at presently automated snow survey locations. At each site is an inch-thick, stainless steel "pillow," filled with antifreeze and laid on the bare ground. The pillow serves as a sensor leading to a series of devices that convert the weight of snow resting on the pillow into an electrical reading of snow's water content. Other sensors at the site include rainfall gages, thermometers, and other climatological instruments.

Additional equipment at the sites selected for conversion to the SNOTEL system includes a radio transmitter-receiver, powered by batteries connected to solar panels. The radio will read data from as many as 16 sensors every 15 minutes and store the information awaiting the signal from a master collection station to transmit.

The new communication technique will eliminate the need for building and maintaining the series of relay stations now required to transmit information from presently automated snow survey locations. It also will eliminate hazardous, time-consuming manual surveys on critical measurement sites where surrounding terrain makes relay stations impractical. With SNOTEL,

The SNOTEL system, with its ability to provide new data nearly instantaneously, will help forecasters determine the timing of streamflows as well as the volume.

Snow in the jagged Rockies is the source of much of the western water supply.

The new technique will eliminate hazardous, time-consuming manual surveys on critical measurement sites where surrounding terrain makes relay stations impractical.

distant or hard-to-reach snow courses can be "surveyed" as often as new information is needed.

Automated SNOTEL sites will go into operation on a test basis as they are linked to the new communication system this spring and summer. The first phase of the SNOTEL system, involving 160 sites, will be in full operation by late summer. And within the next 3 years, about 500 remote snow survey sites are scheduled to be automated, providing an improved information system for water users throughout the West.

Mountain snowpack accumulated during winter and spring provides more than 70 percent of the western water supply during the year. The SNOTEL system, with its ability to provide new data nearly instantaneously, will help forecasters determine the timing of streamflows as well as the volume. In the future, humidity, wind speed and direction, and other environmental data may be added to the information relayed from SNOTEL sites.

The new system will not competely replace the older snow survey techniques, largely because of cost. Manual measurements still will be taken on easily accessible survey courses.

States included in the SNOTEL network are Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Although a number of remote sites in Alaska are being automated, they will not be tied into the network. In California, SCS is working with the State Department of Water Resources, which has its own survey and forecasting program.

Regardless of the level of automation in different states, snow surveyors will continue to go through essentially the same historical process—gathering data from January to June, processing the information through special formulas to obtain water forecasts, and issuing frequent outlook reports for every important watershed at key points along rivers and at reservoirs.

But future forecasts will be more accurate and up-to-date, thanks to quarter-inch silicon chips and to tiny bits of space debris meeting a fiery end.

Mr. Barton is Head, Water Supply Forecasting Unit, SCS, West Technical Service Center, Portland, Oregon.

Photos courtesy Intel Corporation, Western Union Corporation, and USDA.

What's It Worth?

by Shirley J. Elliott

Snow surveyors taking February measurements this year at Mount Hood found levels at one-third the long-term average. Use of water supply forecasts brings more income to irrigated farms.

During present drought conditions in the West, one might suggest water supply forecasts are invaluable to irrigation farmers. But during an average year, the forecasts provide benefits in 11 western states of $43,436,000, according to a recent Soil Conservation Service study.

The evaluation, conducted last year, noted that the addition of the SNOTEL automated system is expected to increase the program's benefits by $4 million to $6 million a year.

The value of water supply forecasts was estimated using crop yields and prices, water supply levels, water prices, farming methods, and other factors. Data gathered at field locations were incorporated into a complex economic model designed to show differences in net income for average size irrigated farms.

Of the 16 million acres of irrigated land in the 11 western states, about 10 million acres are served by water supply forecasts. Farmers who do not use water supply forecast information tend to plant about the same acreage and the same crops each year. Farmers who use the forecasts to plan farm operations alter the acreage used and the types of crops planted.

The increase in income provided by using water supply forecasts varies from year to year, depending on crop market conditions and the water supply itself. It also varies greatly from place to place, depending on climate.

Some areas, for example, have a desert climate that requires full irrigation for any agricultural enterprise. The water supply is scarce and highly variable, and even in the best years, it is totally allocated. For a 320-acre farm in such an area, careful use of water supply forecasts can increase average annual net income by $90 per acre.

A less dramatic increase is reflected in areas that have a more gentle climate with a moderate growing season and limited rainfall. In this case, the evaluation showed that using water supply forecasts can increase average annual net income by about $5 per acre.

The evaluation of the snow survey and water supply forecast program also concluded that:

- Irrigated agriculture and agriculture-related businesses constitute more than half of the water supply information users.
- The SCS water supply forecast procedure is the most accurate currently available. The SNOTEL system is expected to increase overall accuracy by 20 to 30 percent.
- With SNOTEL in operation, the program will provide $20 in benefits for each dollar spent obtaining and issuing water supply forecast data.

The study also found a variety of forecast users in addition to those related to irrigated agriculture. They included individuals and agencies responsible for flood control, municipal water supplies, reservoir management, power generation, recreation, industry, and fish and wildlife management.

Ms. Elliott is a program analyst, Program Evaluation Division, SCS, Washington, D.C.

An irrigation system being adopted by many Florida farmers uses less water and labor to do a better job.

by Martin L. Clark

Plastic Pipe Replaces Ditches

"I'm sold on semiclosed irrigation systems. They save water, electricity, and labor," said John "Buck" Sykes, an Elkton, Florida, vegetable grower.

For 50 years, vegetable farmers in St. Johns County used open irrigation mains, 6 feet and deeper, and shallow laterals to irrigate their crops. This system required large pumps to fill the main ditches before water would spill into the laterals.

By replacing the open main ditches with 2- to 6-inch plastic pipe buried 2 feet deep, a semiclosed system uses almost 40 percent less water. A 40-acre semiclosed system can save 2.5 million gallons of water during a 4-day irrigation period. Because it must transport less water, a semiclosed system requires fewer pumps, less pumping time, and less energy.

Sykes, a cooperator with the St. Johns Soil and Water Conservation District (SWCD), formerly used three pumps to irrigate the same acreage he now irrigates with one.

Filling mains and laterals using old open system (far left) often takes a day or more. Water reaches furrows (at left) as soon as pump is turned on in semiclosed system.

Cabbage and potatoes provide the first test for semiclosed systems in Florida.

Semiclosed systems eliminate the need for repair of clogged, broken pipe (top) and provide control valves in each lateral (bottom) for careful regulation of water reaching crops.

Joe Davenport, SCS district conservationist, noted, "Buck's system is designed so that all he has to do to irrigate a 40-acre field is turn on his pump. The same 40 acres used to require one man working a day and a half to irrigate."

In a semiclosed irrigation system, a plastic gate valve installed at each lateral controls the volume of water. By following SCS guidelines, a farmer knows how long he must run his pump to most efficiently irrigate a particular crop.

"The old open system served the purpose for many years, but growers had to keep a close watch to make sure it was working just right," according to Davenport. "Otherwise, too much or too little water could get to the crops. Either situation could mean crop damage."

Davenport has helped cooperators in the St. Johns, Putnam, and Flagler SWCD's plan more than 400 semiclosed systems. More than 300 already are developed, irrigating 14,000 acres in the area.

Semiclosed systems are becoming more popular in other parts of the state as well, especially in the vegetable-growing area of the Hillsborough and Palm Beach-Broward SWCD's.

Semiclosed irrigation systems conserve water in other ways, too. Because the water going to crops is more closely regulated, less water runs off fields and into the St. Johns River. And since the water travels through buried pipe, much less evaporates.

Irrigation water and municipal water for central and south-central Florida is pumped from the Floridan Aquifer. More efficient irrigation results in less water being pumped from the aquifer and slows the rate of saltwater seeping into it.

Mr. Clark is public information officer, SCS, Gainesville, Florida.

Bumper stickers in Bucks County, Pennsylvania, proudly proclaim membership in the Peace Valley Yacht Club—a distinction that impresses few neighbors.

The World's Least Exclusive Yacht Club

by Frederick E. Bubb

Lake Galena, formed by P. L. 566 dam, offers most popular small-boating site in Bucks County. A 1,500-acre park surrounds the 2-mile-long lake.

A few years ago, Bucks County, Pennsylvania, didn't have a body of water wider than "a couple of bathtubs," according to one resident. Today, it is the site of "the world's least exclusive yacht club."

Peace Valley Yacht Club is headquartered on Lake Galena, within 35 miles of Philadelphia. The lake, completed in the fall of 1973, is one of 10 built as part of the Neshaminy Creek Watershed Protection and Flood Prevention Project. The lake provides water for Bucks County as well as flood prevention and recreation.

Sponsors of the Public Law 566 project are the Bucks County and Montgomery County conservation districts and the two counties' boards of commissioners.

Lake regulations ban power boats and limit all other boats, except canoes, to 16 feet or less in length. More than half the watercraft on the lake are sailboats.

Peace Valley Yacht Club was started in 1974 by the Bucks County Department of Parks and Recreation. Its membership has gone from 800 during its first year to more than 1,300 in 1976.

"Very few of our sailboats cost more than $1,000," reported club spokesman Ronald Ebberts. "Some of

the used craft cost as little as $100. Our dues are $10 a year per family, and membership is open to any Bucks County boater. That's why we are the least exclusive yacht club in the world."

The club, a member of the North American Yacht Racing Union, conducts a regular racing schedule on the lake.

Lake Galena is 2 miles long, covers 365 acres, and is surrounded by a 1,500-acre county park.

Peace Valley County Park's temporary facilities for boating, fishing, and picnicking already are overused, according to George Coller, SCS district conservationist, Doylestown. "By the end of last September, we had more than 114,000 visitors, and most of the facilities planned for the park weren't even completed yet," Coller noted.

Construction began early this year on more parking, boat access, and picnic areas—plus facilities for nature study, horseback riding, and golf—using SCS and local funds. When finished, the park will accommodate 180,000 visitors a year.

Mr. Bubb is public information officer, SCS, Harrisburg, Pennsylvania.

George Coller looks over stone waterway that carries storm runoff water from park without danger of soil erosion.

Young fishermen are among thousands who visit lake—even before recreation facilities have been completed.

Fishing Fingers

by George N. Coller

Pine Run Reservoir's new peninsulas help trap sediment, improve fish habitat, and add shoreline for recreation use by residents of adjacent retirement community and nearby towns.

Less than a mile from Peace Valley's busy yacht club is a small reservoir that has undergone a transformation with fish and fishermen in mind.

Another of the 10 lakes and reservoirs that are part of the Neshaminy Creek Public Law 566 project, Pine Run Reservoir was designed for flood control. With the addition during 1975 of a series of fishing peninsulas, or fingers, at the upper end of the 40-acre reservoir, stocked fish can survive year around.

"The flat valley floor lends itself well to the changes we've made," noted John T. Carson, recently retired executive director of Bucks County's Neshaminy Water Resources Authority. "Deepening the shallow end of the reservoir—where there used to be less than a foot of water—and building peninsulas with the dredged soil has given us pool areas up to 4 feet deep."

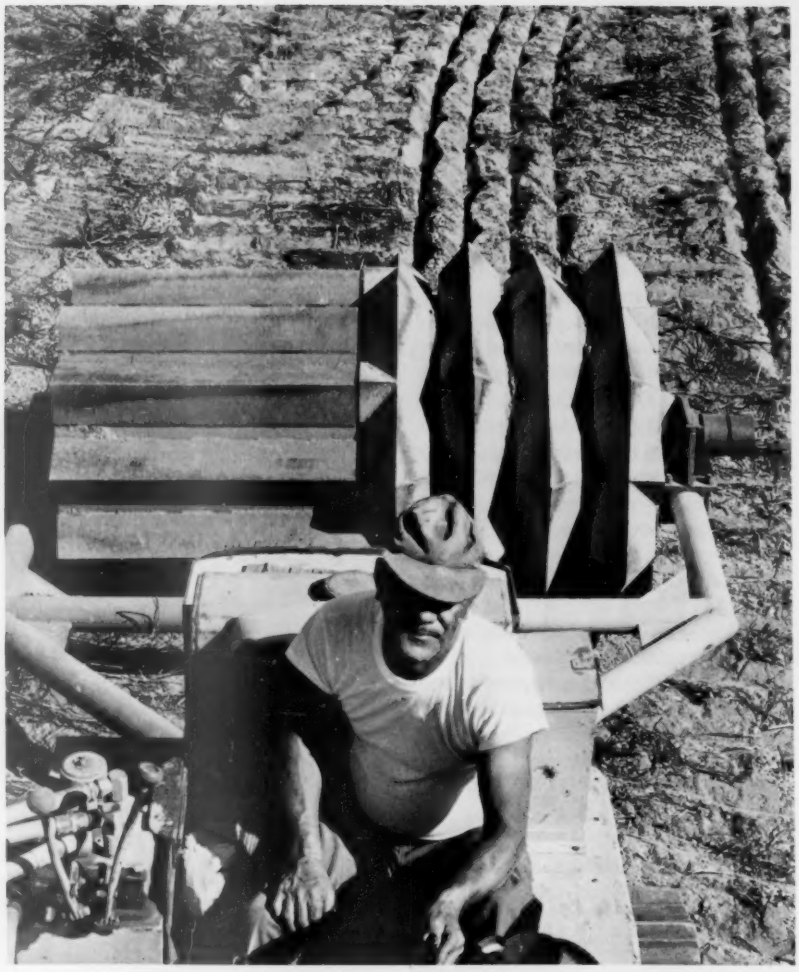
The pools provide still-water habitat for largemouthed bass stocked by the Pennsylvania Fish Commission. The $34,000 effort, financed by Bucks County, is one of the measures outlined in a watershed-wide fisheries plan developed by the fish commission and Public Law 566 project sponsors.

"The fingers also serve as moneysaving sediment traps," according to Carson. "We expect that minor dredging around the peninsulas will eliminate the more expensive maintenance process of lowering the water level to remove sediment that otherwise would spread throughout the upper third of the reservoir."

Plans are underway to add a picnic area, parking lot, and other facilities to further improve the area for recreational use.

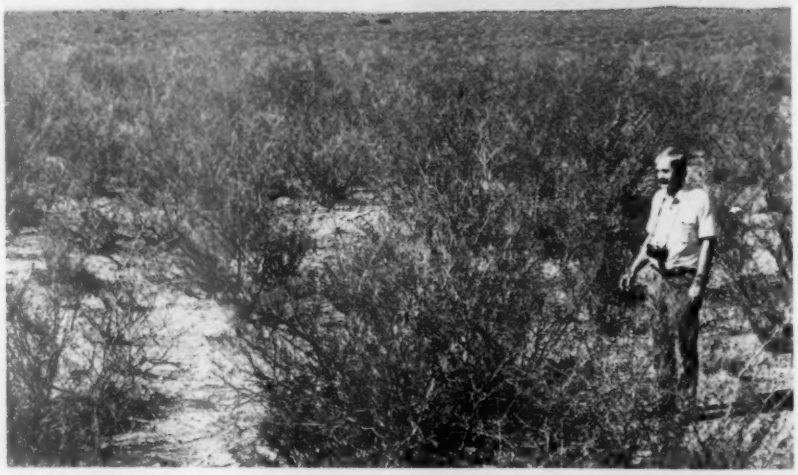
Mr. Coller is district conservationist, SCS, Doylestown, Pa.

Patterned Soil Grows Grass in the Desert

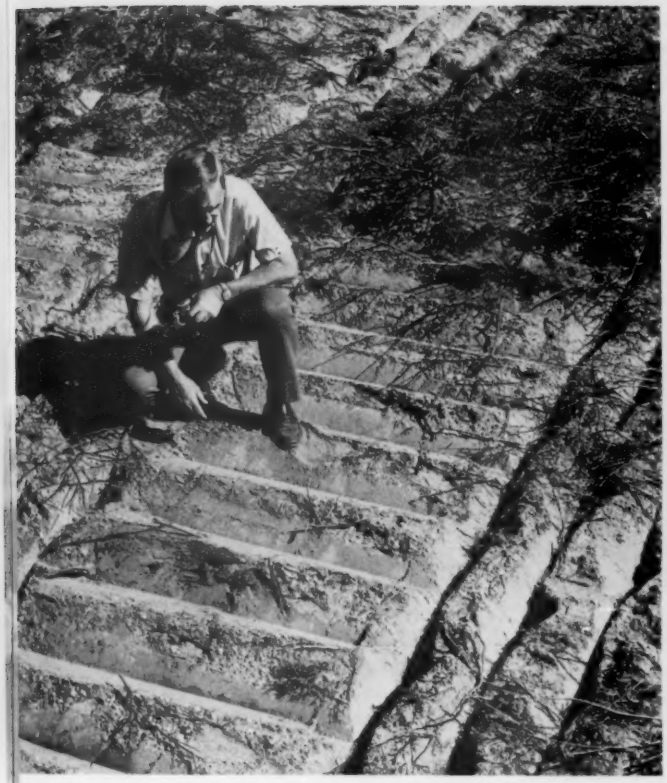


At right, imprinter creates patterns in soil with a single moving part—a massive compound roller with central axle which turn together as a rigid assembly.

Tillage roller also crushes brush and other plants to form mulch that increases infiltration rate and reduces soil erosion.



Grass may be grown successfully in many arid and semiarid lands, like these near Tucson, Ariz., with newly invented land imprinter.



After imprinting, grass is planted in vertical furrows. Right-angle furrows supply additional runoff water to germinate seeds during infrequent rains.

So far, 10 imprint cylinders, which can be paired to produce 45 different geometric patterns, have been developed and fabricated. Weight of cylinders can be increased by filling with water.

A newly developed land imprinter shows promise of turning arid wastelands into grasslands by "waffling" and mulching the soil to catch runoff and increase infiltration.

A new tillage implement may help create grassland out of near-barren desert in the Southwest and other dry areas.

The tool, called a land imprinter, is the invention of Dr. Robert M. Dixon, soil scientist with the Agricultural Research Service's Tucson, Ariz., research center. The imprinter presses furrows and seedbeds of varying depths in geometric patterns on depleted rangeland. The patterns direct runoff water and concentrate it where new vegetation is seeded.

Bare soil in the Southwest sheds water because it has well-developed surface drainage patterns and because each raindrop seals the surface more tightly. Water that does soak in penetrates the soil to such shallow depths that it evaporates quickly. Plants die out and leave the surface more barren than before. Overgrazing, overcultivation, and short-term droughts accelerate surface sealing.

Dixon's land imprinter ends this process by increasing the infiltration rate of water and getting strips of healthy grass started. The implement consists of two hollow steel cylinders, each about 40 inches wide, towed in tandem by a tractor of at least 30 horsepower. Angle irons welded to the cylinders form the geometric patterns.

Typically, one cylinder indents runoff furrows, while the other forms a seedbed for grasses. The runoff strips conduct rainfall into seedbed furrows, where it is held until it soaks in.

In tests conducted last summer, sideoats grama seed germinated quickly in the runoff-irrigated seedbed. Most seedlings grew well.

The imprinter also crushes brush and other plants to form a mulch, which shields the soil from the direct impact of raindrops and provides food for ants, termites, and small rodents that perforate the soil.

With variations in cylinder combinations, the compound roller also can crush soft rock, embed brush and rock into the soil, and compact or dig the surface.

"Imprinting very effectively controls erosion," says Dixon. "The compacted, stable surface and the vegetation and rocks embedded in the soil protect against wind erosion. And because imprinting breaks up established surface drainage patterns and controls runoff, it protects against water erosion."

While the land imprinter costs about the same as existing range tillage implements, it is more versatile and costs less to operate and maintain, according to Dixon.

The scientist presently is modifying his invention to make it useful on cropland.

by Charles Hamura

Irrigation through the Grapevine

Modern irrigation and conservation techniques are helping give an age-old crop a new start on the slopes of Mount Haleakala in Hawaii.

Each week Joanne Tedeschi measures sugar content of ripening wine grapes with a refractometer.

A 200,000-gallon reservoir under construction will assure a stable supply of irrigation water for island vineyard.

Great contoured fields of pineapple and sugarcane represent Hawaiian agriculture to most people. Many would add papaya, banana, and taro to the list. But grapes?

Emil Tedeschi hopes to add to the traditional view of island agriculture with a new venture on the southwestern slopes of Mount Haleakala. He is convinced that table and wine grapes can be produced profitably on the island of Maui, given proper selection, propagation, and processing.

A native of California's Napa Valley, Tedeschi learned vineyard culture and winemaking while working for a winery there. He planted the 7-acre Maui vineyard about 3 years ago as a joint undertaking with the Ulupalakua Ranch.

Tedeschi, a cooperator with the Central Maui Soil and Water Conservation District, turned to SCS for help in laying out his vineyard on the contour and in designing its drip irrigation system.

SCS technicians recommended suspending laterals and emitters on the vine trellises rather than using conventional on-the-ground installation of the drip irrigation lines. The system allows easy maintenance and efficient water application.

A 200,000-gallon reservoir under construction upland from the vineyard will assure a source of irrigation water during critical stages of grape growth. SCS provided technical help for the project, and financial assistance came from the Agricultural Stabilization and Conservation Service.

Tedeschi used the published cooperative soil survey to help determine his land's characteristics of drainage, waterholding capacity, soil texture, and acidity.

He first made test plantings of 140 varieties of grapes. Included were several from South Africa, Australia, and California. He now has narrowed that number to two varieties.

Determining the best time for harvesting grapes is critical. Tedeschi and his wife, Joanne, use a sugar refractometer to make weekly checks of the ripening grapes. "The proper sugar content depends on the kind of wine you want, but it generally should be between 20 to 24 percent for wine making," according to Tedeschi. "For table grapes, the proper sweetness is determined by taste."

Tedeschi says most of his production will go to making wine, which requires 2 to 5 years of aging. However, Mauians can expect some locally grown table grapes on the market late this summer.

Mr. Hamura is a soil conservationist, SCS, Wailuku, Hawaii.

208 Film In Production

A University of Wisconsin production crew is filming sediment control and stormwater management practices in 11 states for a movie on nonpoint-source pollution.

The film, contracted by the National Association of Conservation Districts, will feature efforts by landowners, government agencies, and conservation districts to prevent sediment and nutrient runoff.

"We want to illustrate the issues and activities that are being generated by Section 208 of the Federal Water Quality Act Amendments of 1972," said Director J. Robert Burull.

Burull's crew is filming pollution problems and control efforts in Arizona, Idaho, Indiana, Kansas, Maryland, New Mexico, North Carolina, North Dakota, South Carolina, Washington, and Wisconsin.

The film, being produced under an Environmental Protection Agency grant, is scheduled for release during fall 1977.

Meetings:

March	
5–9	Association for Supervision and Curriculum Development, Detroit, Mich.
6–8	The Wildlife Society, Atlanta, Ga.
6–9	North American Wildlife and Natural Resources Conference, Atlanta, Ga.
20–25	American Concrete Pipe Association Annual Convention, Las Vegas, Nev.
21–24	Land Use Planning Symposium, sponsored by Soil Conservation Society of America, American Institute of Planners, American Society of Planning Officials, Council of State Governments, National Association of Conservation Districts, and Urban Land Institute, Omaha, Nebr.
21–25	Hardwood Plywood Manufacturers Association Annual Spring Meeting, Cancun, Mexico
25–27	National Wildlife Federation, Washington, D.C.
30–31	Air Pollution Control Association, Washington, D.C.
April	
3–5	American Pulpwood Association, Atlanta, Ga.
3–6	National Water Safety Congress, Memphis, Tenn.
6–8	Engineering Geology and Soils Engineering Symposium, Pocatello, Idaho
11–16	International Agricultural Plastics Congress, San Diego, Calif.
23–28	American Society of Planning Officials, San Diego, Calif.
24–27	Association of American Geographers, Salt Lake City, Utah
May	
8–11	National Forest Products Association, Washington, D.C.
8–13	National Council of State Garden Clubs, Inc., Convention, Kansas City, Mo.
8–13	The American Water Works Association Conference, Anaheim, Calif.
10–12	Conference on Great Lakes Research, Ann Arbor, Mich.
23–25	1977 National Conference on Water, St. Louis, Mo.
30–June 3	American Geophysical Union, Washington, D.C.

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